

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Ronald D. Blum

Application No.: 09/994,860

Filed: November 28, 2001

For: METHOD AND APPARATUS FOR
REDUCING THE INTENSITY OF
HURRICANES AT SEA BY DEEP-
WATER UPWELLING

Confirmation No. 9812

Examiner: BOECKMANN, Jason J.

Technology Center/Art Unit: 3752

APPELLANTS' REPLY BRIEF UNDER
37 CFR §41.37

Mail Stop Appeal Brief
Commissioner for Patents
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Sir:

The following remarks are directed to the new points of argument raised in the Examiner's Answer dated January 9, 2009. As explained in detail below, the Examiner's Answer continues to improperly apply the law regarding utility and enablement, and improperly rejects evidence, including expert Declarations, that establish the utility and enablement of the claimed subject matter. In particular, the Examiner attempts to discount the significance of the evidence of record by approaching the Declarations in a piecemeal manner and, moreover, mischaracterizes significant details from the Declarations in support of the flawed rejections of record. Proper application of the law, in consideration of Appellants' disclosure and the additional evidence submitted, demonstrates that the present subject matter meets the standard for utility and is sufficiently enabled to one of ordinary skill in the art..

Accordingly, this Honorable Board should reverse the rejections of claims 1-17 and 33-36.

I. The Examiner's Answer Improperly Dismisses the Evidence of Three Expert Declarations¹

The claimed invention is based on a combination of features, most generally: (1) generating at least one bubble plume from at least one submersible (2) the at least one bubble plume upwelling water from a depth to a surface of the ocean and cooling the surface of the ocean, and (3) and the cooled ocean surface reducing the intensity of the hurricane. The specification provides enabling description for each of these features. The specification also discloses combining these features. For example, the specification at [0006] indicates that artificial upwelling of deep, cold seawater is desirable to realize the same hurricane intensity reductions that are predicted by numerical models and observed when hurricanes are exposed to natural cold water upwelling. Similarly, the specification at [0030] discloses the release of gas plumes from submersibles below a thermocline for the purpose of upwelling the colder deep water to reduce the ocean surface temperature. Formulae to calculate the amount of upwelling are provided at paras. [0052] and [0053].

Faced with a rejection based on lack of enablement, restated most recently at Ex. Ans. Pages 4-5, Applicants provided Expert Declarations showing how each of the features enumerated above are enabled by the specification. Because the features enumerated above are in different fields of technical endeavor, i.e., (1) submersible construction, (2) bubble plume dynamics, and (3) hurricane dynamics, three different declarations were provided from experts having different expertise.

The Examiner's Answer broadly asserts that "[i]t is the examiner's position that the three declarations present facts that are unconnected and do not establish utility or enablement of the claimed subject matter." (Ex. Ans. Page 6, lines 9-10).

With respect to the Ginis declaration, the Examiner concedes that "it is understood that if the surface temperature of the ocean in the area that the hurricane [sic] drops 2.5 degrees the hurricane will reduce in intensity." The Examiner's primary issue with the Ginis declaration

¹ The Examiner's Answer again questions the assertions of each of the Declarants because "[i]f the author of the declaration is receiving monetary compensation, there appears to be a financial interest." Appellants have previously

appears to be that it does not address how to reduce temperature. Ex. Ans. Page 7, lines 3-11. But it is not surprising that the expert in hurricane dynamics provided testimony relating to hurricane dynamics, as opposed to submersible construction or bubble plume dynamics. Nor is it relevant, because enablement of temperature reduction is addressed elsewhere.

With respect to the Rondorf declaration, the Examiner concedes that the technology to convert existing submarines to carry gas exists. (Ex. Ans. Page 7, lines 12-13). The Examiner's primary issue with the Rondorf declaration appears that it does not address bubble plume dynamics or how to reduce temperature. (Ex. Ans. Page 8, lines 5-10; Page 8, line 21-Page 9, line 2). Again, it is not surprising or relevant that the expert in submarine construction provided testimony as to how the specification enables construction of submersibles as opposed to bubble plume dynamics or hurricane dynamics.

With respect to the Singleton declaration, the Examiner concedes that the declaration "properly calculates the number of linear and circular diffusers needed to upwell at a rate of at least 12.1 million cubic meters per second." Ex. Ans. Page 9, lines 3-6. The primary criticisms of the Singleton declaration appear to be that it does not show how such upwelling would reduce ocean temperature by a specific amount, or reduce hurricane intensity. Ex. Ans. Page 9, lines 6-11, Page 10, lines 12-15. Again, with respect to the later point, it is not required that the expert in bubble plume dynamics address hurricane dynamics. With respect to the former point, the Singleton declaration at para. 8 does establish that surface temperature would be reduced. The specification at para. [0052] provides an undisputed formula establishing a specific amount of temperature reduction based on simple calculations.

The Examiner's Answer improperly weighs the evidence of record, including the specification and the Declarations. When viewed as a whole, the evidence of record shows that the Appellants' disclosure establishes the utility and enablement of the claimed subject matter. The specification itself describes the combination of (1) submersibles to generate bubble plumes, (2) the upwelling of cold water by the bubble plumes, and (3) the resultant cooling of the ocean surface and hurricane intensity reduction may be achieved. The Declarations provide un rebutted

addressed this incorrect assumption on the part of the Examiner, and reiterate that, simply because an expert is paid a fee to prepare a Declaration does not imply a financial interest in the outcome.

support showing that each of the elements is enabled by the specification, from an expert having expertise related to each particular element. While no single declaration addresses enablement of all of the claimed features due to diversity in the fields of endeavor to which those features belong, such a declaration is not required. The Declarations taken together provide ample and un rebutted evidence that the claimed subject matter is enabled by the specification and is based on accepted scientific principles.²

A. It Is Accepted In The Art That A Cooled Ocean Surface Reduces The Intensity Of A Hurricane

The Examiner's Answer concedes that, if the surface temperature of the ocean in the area of the hurricane drops 2.5°C, the hurricane will reduce in intensity. (See Ex. Ans. Page 7, lines 5-7). Appellants agree that this is well established in the record, including the specification, and the Expert Declarations. However, the record also supports the conclusion that temperature changes of less than 2.5 °C may reduce the intensity of a hurricane. For example, the Declaration of Dr. Ginis discusses computer models that indicate reduced hurricane intensity resulting from temperature anomalies of 1°C and 2°C. (Ginis Declaration ¶¶15-16).

Thus, the Examiner's statement that "Isaac Ginis Ph.D. merely shows numerical modeling of how a reduction of sea surface temperatures by 2.5 degrees would affect a numerical model of a hurricane" is incorrect as to the scope of Dr. Ginis' Declaration. Moreover, it mischaracterizes the relevant ranges discussed in Appellants' specification.

Appellants' specification discusses how the physics of natural and artificial hurricane intensity control appear to be governed by sea surface temperature (SST) and the thermal structure (density stratification) of the upper ocean. These influences are combined into a single

² The Examiner also raises for the first time in the Examiner's Answer at page 11 an allegation that the declarations may have been altered after signature. Such alteration did not occur. Because it is improper for the Examiner to raise such an allegation for the first time at this late stage, Appellant is not addressing the allegation other than noting that the last page may have a slightly different appearance from the rest of the document due to the submission of a signature page that had been transmitted by the Declarant to the law firm via facsimile or .pdf scanning, as opposed to via mail or Word file, as is common in the preparation of such documents when time constraints do not allow for mailing. If the Board is considering basing any aspect of its decision on this improperly raised allegation, Appellants request an opportunity to submit evidence as to the authenticity and unaltered nature of the executed Declarations.

parameter, Hurricane Heat Potential (HHP), which is used by meteorologists to quantify the heat energy in the upper ocean that is available to fuel a tropical storm. Since SSTs of less than 26°C typically cannot support hurricane development, HHP is defined as the heat content in excess of 26°C typically per unit area of the underlying water column between the sea surface and the depth of the thermocline. (Appln. ¶[0007]). These matters are also attested to by Dr. Ginis. (Ginis Declaration ¶7).

Appellants disclose embodiments that, taking into account the above dynamic, are calculated to reduce the temperature of an interception area volume in ocean areas with, for example, a surface temperature of 28.8°C and volume average temperature of 27.74 °C. (Appln. ¶[0042]). Appellants discuss how reducing the layer temperature to 26°C is used as a conservative estimate that would eliminate the HHP within the interception area. (*Id.*). However, it is specifically stated that this is not intended to limit the scope of the invention, which may include situations in which the entire HHP need not be eliminated in order to reduce the intensity of a hurricane. As attested to by Dr. Ginis, volumetric temperature anomalies of 1°C and 2°C can be expected to reduce the intensity of a hurricane by 6% and 10% respectively. (Ginis Declaration ¶16).

Appellants submit that the relevant facts and logic regarding the above matters are fully established in the record, e.g. that reducing the temperature of an HHP level in the path of a hurricane can reduce the intensity of the hurricane.

B. Appellants Have Enabled Generating At Least One Bubble Plume From At Least One Submersible.

The Examiner's Answer concedes that the technology exists to convert existing submarines to carry gas. (Ex. Ans. Page 7, lines 12-13). The Examiner's Answer seems only to challenge (1) the factor of CAPT Rondorf's calculations, (2) whether CAPT Rondorf's Declaration establishes "the amount of gas required to lower the surface temperature of the ocean to be effected by a hurricane by 2.5 degrees to thereby reduce the intensity of, or form a reduced intensity hurricane" and (3) "how these 19 or 20 submarines bubbling up 1. 4 million m³ of liquid CO₂ will be able to replace 23 percent of the water in a volume that is 180 km by 540 km

by 70 km deep, as mentioned in the specification (page 12).” However, Appellants respectfully submit that these matters do not support a rejection for lack of utility or failure of enablement because, in the case of (1) the assertion is incorrect and immaterial, and in cases (2) and (3) the alleged deficiencies are addressed by the specification and/or other expert Declarations.

Appellants have previously addressed the alleged “flaw” in CAPT Rondorf’s Declaration regarding how many submersibles would be needed in order to carry the amount of liquefied gas required for the disclosed upwelling. CAPT Rondorf provides the example of the conversion of the vessel NR-1 merely to show that conversions of submersible from one use to another have been done. The calculations in question are based on a Typhoon hull, which is a known submersible that CAPT Rondorf characterizes as the “preferred choice for conversion to a gas carrying capacity.” (Rondorf Declaration ¶9). Therefore, “the calculations presented on page 5 of the declaration are” not off “by a factor of about 73” as the Examiner alleges. Moreover, CAPT Rondorf specifically states that “existing submersible[s] can be easily scaled up to increase gas carrying capacity.” (Rondorf Declaration ¶10).

Regardless, even if more or bigger submersible hulls were required, this would not indicate that the invention was therefore lacking utility or was not enabled.

With respect to whether CAPT Rondorf’s Declaration establishes “the amount of gas required to lower the surface temperature of the ocean to be effected by a hurricane by 2.5 degrees to thereby reduce the intensity of, or form a reduced intensity hurricane,” Appellants note that the claims and specification do not require lowering the surface temperature of the ocean by 2.5 degrees. As discussed above, the specification is not limited to this temperature, and the Ginis Declaration provides evidence of the efficacy of temperature anomalies of 1°C and 2°C. (Ginis Declaration ¶¶15-16). In any event, these matters are sufficiently addressed by the specification, the Ginis Declaration and the Singleton Declaration, as discussed further below.

Likewise, “how these 19 or 20 submarines bubbling up 1.4 million m³ of liquid CO₂ will be able to replace 23 percent of the water in a volume that is 180 km by 540 km by 70 km deep, as mentioned in the specification (page 12)” is specifically addressed by the Singleton Declaration. (See Singleton Declaration ¶¶8-9).

The Examiner also focuses on a statement that “submersibles of the kind required for this application do not presently exist.” (Ex. Ans. Page 8, lines 13-14). The Examiner appears to be objecting to whether Appellants had actually built a submersible with all of the features described in the specification. It is true that the United States Navy had not provided the Applicants with a Typhoon-class submarine for modification to release large volumes of gas. However, it is well-settled that patent applicants need not provide evidence of either conception or actual reduction to practice when relying on the content of the patent application. *Hyatt v. Boone*, 146 F.3d 1348, 1352, 47 USPQ2d 1128, 1130 (Fed. Cir. 1998). Appellants sufficiently describe submersible systems that, according to CAPT Rondorf, could have been implemented at the time of the invention without undue experimentation. The filing of a patent application serves as conception and constructive reduction to practice of the subject matter described in the application. MPEP §2138.05. Whether Appellants had the resources to construct or modify a fleet of submersibles is not germane to this analysis.

C. The Record Supports The At Least One Bubble Plume Upwelling Water From A Depth To A Surface Of The Ocean, The Upwelled Water Cooling The Surface Of The Ocean.

The pending application describes how to calculate the total volume of upwelling water to weaken a major hurricane. (See Appln. at ¶¶ [0040]-[0053]). Appellants again note the equation given in paragraph [0052], which provides one of skill in the art with the fraction, f , of the total interception area volume to be replaced by upwelling water in order to achieve a final layer temperature of 26°C in accordance with the example provided. The Examiner’s Answer does not apparently challenge this equation. There is certainly no evidence, scientific reasoning or law of thermodynamics presented to challenge it. Therefore, Appellants submit that the disclosure of this un rebutted formula constitutes a “fact tying the upwelling of the ocean water to a specific temperature drop in the surface of the ocean.” (Ex. Ans. at Page 9, lines 10-11).

In addition to the description in the disclosure, Appellants have submitted the Singleton Declaration which provides support that one of ordinary skill in the art using the amount of direction provided for in the specification in combination with the knowledge of one skilled in the art is able to calculate the total volume of upwelling water and total volume of gas required

that would create an upper ocean area of sufficiently lower temperature. Specifically, in her Declaration, Ms. Singleton attests that the “Declaration provides support for an initial order-of-magnitude estimate of the gas flow rate and the quantity of gas required to induce an adequate upwelling flow rate to lower the temperature of the upper sea surface, using the amount of direction provided for in the specification in combination with the knowledge of one skilled in the art at the time of filing the application, such as the use of two existing bubble-plume models, without any undue or unreasonable experimentation. (Singleton Declaration at ¶5)(emphasis added). The Declaration goes on to state that “[b]ecause the intent of the apparatus is to cool surface waters, the lowest gas flow rate that upwelled water to and detrained at the surface was selected” and that “[i]t would be expected that the artificial upwelling of the deep, cold seawater to the sea surface layer by the bubble-driven plume would create an upper ocean layer region of sufficiently lower temperature.” (*Id.* at ¶8). The Examiner’s Answer does not challenge or contradict these statements.

Instead, the Examiner’s Answer alleges first that the “specification and the Ginis declaration both require that the surface temperature of the ocean be reduced 2.5 degrees for the intensity of the hurricane to be reduced.” However, as discussed above, this statement is factually incorrect.

The Examiner’s Answer then reiterates that the “present invention does not use the exact methods or diffusers that are being used in Ms. Singleton’s calculations.” (Examiner’s Answer at Page 9). Appellants have previously addressed this invented requirement that Ms. Singleton use the exact methods or diffusers as disclosed in the claimed invention. Ms. Singleton’s Declaration reflects (1) the use of the disclosure as a guide to arrive at her estimate of the gas flow rate and the quantity of gas required to lower the temperature of the sea surface, and a reasonable correlation to the scope of the claims. No more is required.

Finally, the Examiner alleges that “Ms. Singleton calculates that 233 linear or 236 circular diffusers would be needed to perform such upwelling. However, the declaration submitted by Captain Rondorf, discussed above, estimates that only 19 submersibles would be required to supply the proper amount of gas. That would mean that each submersible would need to have approximately 12 diffusers connected to its outer shell.” However, the Examiner’s

assertion fails to take account of the full extent of the disclosure and evidence. The example given by CAPT Rondorf, of approximately 19 Typhoon sized hulls to contain a given volume of liquefied gas, does not limit the enablement of the invention. A larger number of smaller submersibles could certainly be used and is supported by the specification and the Declarations. Additionally, the specification discloses several examples illustrating the number of diffusers that may be mounted on the submersibles. *See e.g.*, Figs. 13-16 of the specification.

It is clear from Ms. Singleton's declaration that the number of diffusers needed for implementing the claimed invention were readily ascertained by using the amount of direction provided for in the specification and the knowledge of one skilled in the art without any undue experimentation thereby satisfying the enablement requirement of 35 U.S.C. §112, first paragraph.

None of the above challenges set forth in the Examiner's Answer address the requirements of utility and enablement of the claimed features. Rather, they are inaccurate and improper challenges to evidentiary details that fail to undermine the credibility of the disclosure and the Declarations when taken as a whole.

II. The Above Matters Satisfy The Requirements Of 35 U.S.C. §101

An assertion of utility is credible unless (A) the logic underlying the assertion is seriously flawed, or (B) the facts upon which the assertion is based are inconsistent with the logic underlying the assertion. MPEP §2107.02(III)(B). The features discussed above do not suffer from any demonstrated serious flaw in logic, as attested to by the numerous expert Declarations. Likewise, there is no disconnect between the facts upon which the assertion of utility is based and the logic underlying the assertion. For example, it is logically and factually demonstrated that bubble plumes can be generated from submersibles, bubble plumes can be used to upwell water from a depth to a surface of the ocean, the upwelled water can cool the surface of the ocean, and a cooled ocean surface can reduce the intensity of the hurricane. The fundamental principles upon which Appellants rely are accepted in the relevant fields and/or demonstrated in scientific testing and modeling. This is sufficient for establishing credible utility under 35 U.S.C. §101.

To properly reject a claimed invention under 35 U.S.C. §101, the Office must (A) make a *prima facie* showing that the claimed invention lacks utility and (B) provide a sufficient evidentiary basis for factual assumptions relied upon in establishing the *prima facie* showing. Whenever possible, the examiner should provide documentary evidence regardless of publication date (e.g., scientific or technical journals, excerpts from treatises or books, or U.S. or foreign patents) to support the factual basis for the *prima facie* showing of no specific and substantial credible utility. If documentary evidence is not available, the examiner should specifically explain the scientific basis for his or her factual conclusions. MPEP §2107.02(IV)(emphasis added).

The rejection under 35 U.S.C. §101, set forth on pages 3-4 of the Examiner's Answer, contains no such evidentiary basis, scientific basis, or even factual conclusions. Rather, the rejection is apparently based only on Appellants allegedly having "shown no evidence of reducing speculation and conjecture to practice in either laboratory or natural environment setting. For example, taking into consideration the enormous size of a hurricane, the process of modifying a hurricane disclosed by appellant would take more resources than the resources realistically available to mankind." This statement contains at least three significant errors.

First, it is not the legal standard for utility. Second, it is devoid of evidentiary or scientific basis. What exactly are the "resources realistically available to mankind" and how has the Examiner determined that Appellants' methodology is beyond that capacity? Third, the numerous embodiments disclosed in the specification clearly rise above the alleged "speculation and conjecture" suggested by the Examiner.

Appellants submit that reducing the intensity of a hurricane, as described by Appellants and supported by expert Declarations, has utility that has not, in any way, been rebutted by the Examiner's Answer. It may be expensive to obtain and modify 20 Typhoon-class submarines. But, it is also relatively straightforward to do so, as established by the Rondorf declaration, given sufficient resources and desire. 35 U.S.C. §101 is routinely used to reject certain categories of patent applications, such as those directed to "cold-fusion" or "perpetual motion." Weather modification is not one of those categories, as recognized, for example, in U.S. Patents Nos. 5,492,274 titled "Method of and means for weather modification"; 5,984,239 titled "Weather

modification by artificial satellites”; and 4,141,274 titled “Weather modification automatic cartridge dispenser”.

III. The Above Matters Satisfy The Requirements Of 35 U.S.C. §112, First Paragraph

The standard for determining whether the specification meets the enablement requirement may be determined by asking whether the experimentation needed to practice the invention is undue or unreasonable. As described above, the specification provides specific examples, equations, and methodologies for calculations of upwelling volume, and various embodiments specifically describing such methods. As attested to by the expert declarations, one skilled in the art, dealing in the practical applications of the technology, could implement apparatus to practice the claimed methods. For example, CAPT Rondorf using the information disclosed in the specification in combination with the knowledge of one skilled in the art was able to determine the number of submersibles required to carry out the claimed invention; and Ms. Singleton, using the information disclosed in the specification in combination with the knowledge of one skilled in the art was able to determine the amount of gas required to generate the upwelled water to sufficiently cool a region of the upper sea surface. The number of submersibles required to implement the invention arrived at by CAPT Rondorf leads to a number of submersibles that can be feasibly created.

On page 5 of the Examiner’s Answer, the Examiner attempts to assert a number of rationales in support of the rejection under 35 U.S.C. §112, First Paragraph. However, a cursory review of the various rationales demonstrates that they suffer from many of the same flaws addressed above, and do not support a finding of lack of enablement under the proper legal standard. For example, whether the “claimed invention is broad and sweeping in scope” or the “nature of the invention is a large-scale environment change” does not support a finding of lack of enablement when Appellants have clearly described numerous embodiments that demonstrate how someone of ordinary skill in the art could go about practicing the invention, and provided expert declarations showing that the invention may be practiced without undue experimentation, based on the disclosure of the specification. In this regard, the Examiner’s Answer is unclear

regarding what exactly would be undue experimentation about implementing the described embodiments. As in the case of the utility rejection, the Examiner's Answer again appears to consider the scale of the invention to make it *per se* not enabled. This is not the legal standard.

The scale of the implementation needed does not violate enablement and does not establish undue experimentation. Appellants assert that sufficient detail is provided in the form of well reasoned interception strategies and calculations of upwelling volumes required for each strategy as supported by the Declarations.

Likewise, the amount of experimentation to practice the full scope of the claimed invention is not dispositive, particularly when the experimentation is routine, *i.e.* when the techniques necessary to do so were well known to those skilled in the art. *See, e.g., Ex parte Kubin*, 83 USPQ2d 1410 (Bd. Pat. App. & Int. 2007), *citing Johns Hopkins Univ. v. Cellpro, Inc.*, 152 F.3d 1342, 1360, 47 USPQ2d 1705, 1719 (Fed. Cir. 1998). Appellants disclosure provides considerable direction and guidance to enable one skilled in art to implement the invention in a straight forward manner using technology that existed prior to 2001 as evidenced in the Declarations. The Examiner's Answer does not establish that the mechanics or techniques of validating the claimed invention would have been difficult to understand to one of ordinary skill in the art.

Additionally, Appellants specifically disagree with the assertions that the "level of one ordinary skill in the art is best characterized as that of a theoretical scientist dealing in probabilities and possibilities rather than that of an engineer dealing in practical applications of technology" and that the "outcome of the disclosed concept is entirely unpredictable." On the contrary, the experts who provided Declarations in support of the enablement of Appellants' disclosure are not merely "theoretical scientist dealing in probabilities and possibilities" and each demonstrate in their respective Declarations how one of ordinary skill in the art could take Appellants' disclosure and implement the specific teachings contained therein. Computer models implemented, for example, by Dr. Ginis and Ms. Singleton clearly demonstrate that the disclosed methods are not "entirely unpredictable." Also, someone seeking a submersible having specified capabilities that are achievable with straightforward modifications to existing

submersibles would likely not turn to a “theoretical scientist,” but rather to an engineer with expertise relating to submersibles.

Finally, the assertion that the “quantity of experimentation needed to use the invention based on the content of the disclosure can only be characterized as astronomical considering the lack of background information, past experiment, and specific detail” is simply not true. Appellants have fully complied with their duty of describing the invention in a way that someone of ordinary skill in the art could practice the invention, given enough resources. This would not require as astronomical amount of experimentation to reduce the intensity of a hurricane.

The weight of the evidence as a whole establishes the credible utility and enablement of the present subject matter, notwithstanding the Examiner’s Answer’s piecemeal challenges and rhetorical flourishes to the contrary.

IV. Conclusion

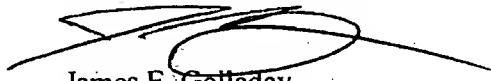
The only pending rejections are based upon 35 U.S.C. §§101 and 112. As explained in the Appellants Brief and herein, these rejections are improper. For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 1-17 and 33-36 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 1-17 and 33-36.

Appl. No. 09/994,860

Attorney Docket No. 027001-000310US PATENT

Appellants also note that the application was filed on November 29, 2001, and has been pending for over 7 years. Given the long pendency of the application, and the Examiner's position that the invention does not have "credible utility," it seems improbable that a reasonable rejection under 35 U.S.C. §§102 or 103 could be articulated. Appellants respectfully request that, if the Board agrees with Appellant that the 35 U.S.C. §§101 and 112 rejections are improper, that the application be allowed as opposed to remanded for further search and consideration.

Respectfully submitted,



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